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REPORTED ARTHROPOD-BORNE ENCEPHALITIDES IN HORSES AND OTHER EQUIDAE

Calendar Year 1972

Animal and Plant Health Inspection Service – UNITED STATES DEPARTMENT OF AGRICULTURE

415245

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Prepared by
Veterinary Services
Animal and Plant Health Inspection Service
United States Department of Agriculture
Federal Center Building
Hyattsville, Maryland 20782

REPORTED ARTHROPOD-BORNE ENCEPHALITIDES IN HORSES AND OTHER EQUIDAE

Calendar Year 1972

SUMMARY

Surveillance

During calendar year 1972, investigations totalling 1,068, were made of suspected equine encephalitis cases. Of this number, 452 were positive of Western equine encephalitis (WEE), and 32 were positive for Eastern equine encephalitis (EEE), with no cases of Venezuelan equine encephalitis (VEE). In other surveillance activities, 1,241,207 mosquitoes were collected, and 15,330 mammal serum samples were collected. There was no indication of epidemic VEE viral activity in the United States from this surveillance. Thus, it is reasonable to assume that epidemic VEE virus did not become established in Texas in 1971. Sampling by species according to state is indicated in Table 1. Table 2 indicates the equine encephalitis activities by State during 1972.

End of Emergency

The VEE emergency was ended effective October 31, 1972, the Federal quarantine on the State of Texas for VEE was released in a companion action.

Duration of Immunity

Studies at Veterinary Sciences Research (VSR), Denver, Colo. on the duration of immunity from TC-83 vaccine revealed that all horses challenged 18 months post-vaccination resisted challenge with epidemic strain VEE virus.

Vaccination Recommendation

An immune equine population is the best method to prevent an epidemic of VEE; therefore, all horses in the entire United States should be vaccinated for VEE. The Department strongly recommends that all horses in the States of Texas, New Mexico, Arizona, and the southern part of California be vaccinated for VEE during 1973, whether previously vaccinated or not, because of the great danger of VEE again entering this country from Mexico.

Mexico VEE in 1972

During 1972, VEE occurred in the central region around Mexico City, as well as in the States of Zacatecas and Durango; however, the greatest threat to the United States proceeded up the western

Table 1.—Cumulative Record of VEE Samples Collected - Calendar Year 1972

States	Equine*		Bovine		Canine		Caprine		Ovine		Rabbits		Swine		Raccoons		Opossums		Other		Cum. Total
	Cur. Mo.	Prev. Total	Cur. Mo.	Prev. Total	Cur. Mo.	Prev. Total	Cur. Mo.	Prev. Total	Cur. Mo.	Prev. Total	Cur. Mo.	Prev. Total	Cur. Mo.	Prev. Total	Cur. Mo.	Prev. Total	Cur. Mo.	Prev. Total	Cur. Mo.	Prev. Total	
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V
Unspecified S. West U.S.		177																			177
Alabama		7				15														10	32
Arizona		3		1		419		4				80				4				33	544
California						104															104
Florida		106				56		17						2		15				568	764
Georgia		3		10		174						1				43		32		26	289
Louisiana		8				776		8		10		11				2				57	872
Minnesota						59															59
Mississippi						6														29	35
New Mexico		3				98						81				2				45	229
New York						69															69
No. Carolina																				5	5
Ohio						50															50
a) Arkansas b) Md.		(c)				(a)														(b)	2 (a
c) Oregon		2				2														10	10 (b
So Carolina						172														35	2 (c 207
So. Dakota		167																		370	537
Texas		698		1,757		3,031		525		309		1,166		1,640		194		82		1,825	11,227
Utah		44		15		18						39									116
Cumulative Totals		*1,218		1,783		5,049		554		319		1,378		1,642		260		114		3,013	15,330

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*Does not include suspicious equine encephalitis cases.

USDA-APHS

Table 2.—Equine Encephalitis Activities During Calendar Year 1972

	Est. horse population	Vaccinations For		Investigations	Positive cases		
					VEE	WEE	EEE
Alabama	129,000	122,343	48	4			
Alaska	3,000		0	0			
Arizona	101,000	89,586	101	4		1	
Arkansas	128,000	126,005	206	4			
California	406,000	382,986	4,160	68		1	
Colorado	125,000		6,444	101		77	
Connecticut	30,000		4,566	11			10
Delaware	8,000	7,916	97	4			
Dist. of Columbia	106						
Florida	145,000	129,215	3,032	12			3
Georgia	107,000	105,002	561	6			1
Hawaii	10,000		14	1			
Idaho	125,000		2,595	32		15	
Illinois	300,000		13,798	25		5	
Indiana	75,000		4,058	15		1	
Iowa	120,000		6	39		16	
Kansas	150,000		2,546	91		71	
Kentucky	170,000	157,394	1,142	2			
Louisiana	150,000	141,503	626	14			
Maine	25,000		52	4			
Maryland	48,000	44,002	532	12			1
Massachusetts	21,000		358	2			
Michigan	169,000		8,506	4		1	
Minnesota	157,000		3,548	124		86	
Mississippi	149,000	145,099	7	16			1
Missouri	188,000		72	1		1	
Montana	250,000		193	46		29	
Nebraska	78,000		5,800	32		19	
Nevada	50,000		4,682	3		1	
New Hampshire	20,000		504	0			
New Jersey	31,000	30,604	0	10			3
New Mexico	90,000	86,450	864	15		3	
New York	250,000		59,040	5			1
North Carolina	129,000	119,149	708	33		1	10
North Dakota	35,000		602	29		21	
Ohio	205,000		15,030	15		1	
Oklahoma	230,000	227,054	1,040	32		7	
Oregon	125,000		6,800	15		5	
Pennsylvania	98,000		4,744	3			
Rhode Island	9,000		0	2			2
South Carolina	70,000	64,356	180	11			
South Dakota	85,000		346	54		38	
Tennessee	180,000	179,297	381	5			
Texas	625,000	574,049	42,096	61		5	
Utah	95,000		6,826	2			
Vermont	12,000		4,922	3			
Virginia	118,000	111,989	579	8			
Washington	125,000		2,327	27		21	
West Virginia	40,000		455	1			
Wisconsin	110,000		8,935	19		5	
Wyoming	48,000		4,784	41		21	
Puerto Rico	25,000						
Virgin Islands	2,000						
	110						
TOTAL	6,174,110	2,844,105	228,913	1,068		452	32

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LIST OF STATES

USDA - ARS

coastline of Mexico from the States of Colima, Jalisco and Nayarit, through the State of Sinaloa, and ended in the State of Sonora near Hermosillo about the middle of September. Hermosillo is approximately 150 miles south of Nogales, Ariz. The Mexican Government vaccinated horses at no expense to the owners during 1972 throughout the country.

SURVEILLANCE PLANS FOR 1973

During 1973, the U.S. Department of Agriculture planned to cooperate closely with Mexico in surveillance of the disease in equidae, mosquitoes, and small mammals. In the United States, the most important part of VEE surveillance would continue to be the prompt investigation of all suspicious cases of equine encephalitis. Laboratory tests would be used to determine whether the virus was Eastern, Western or Venezuelan equine encephalitis. In addition, mosquito collections would be made routinely along the entire Mexican border from Brownsville, Tex., to San Diego, Calif. Cooperation with the U.S. Public Health Service and State and local agencies would continue as in 1972.

VEE PROGRAM IN 1972

VEE was first identified in Venezuela in 1936. For over 20 years, VEE remained confined to the northern part of South America. In 1969, the disease appeared in Central America and within two years spread 2,500 miles northward through Central America and Mexico. The disease moved into the lower Rio Grande Valley of Texas in late June 1971.

A massive campaign involving State and Federal agencies was launched to contain the disease and reduce its impact on human health and the equine industry. The program consisted of three basic parts: (1) Control of horse movement; (2) control of the vectors (mosquitoes); and (3) vaccination of all equidae in the outbreak area and in a zone extending north, east, and west of sufficient depth to reduce the probability of the disease spreading.

Approximately 13 million acres of land were sprayed with malathion or dibrom using the ultra-low-volume technique. Over 2.8 million horses were vaccinated in 19 States and the District of Columbia. The program limited the spread of the virus to 26 counties in the southern part of Texas. (See map, page 5).

Not all horses were vaccinated; so the susceptible horses together with new colts and new herd additions, might have served to potentiate the disease during the 1972 vector season. Additionally, because the role other mammals and birds may play in the spread of VEE is not clearly understood, the disease might have continued to spread in spite of the large number of horses vaccinated. For these reasons, it was evident that a surveillance program essential to determine the area of viral activity and to give warning should the disease move.

Emergency Programs of Veterinary Services, Animal and Plant Health Inspection Service, coordinated the VEE surveillance program with other concerned agencies, including the Department of Health, Education and Welfare (HEW), Department of Defense, Department of Interior, Texas A & M University, University of Wisconsin, South Dakota State University, University of California, University of Miami, State public health officials, and State animal health officials. The National Animal Disease Laboratory, Ames, Iowa, provided laboratory support for most of the program.

As previously noted, the 1972 VEE surveillance program consisted of three parts. The first and most essential part was prompt reporting and field and laboratory investigations of all suspected encephalitis

EPIDEMIC VEE VIRUS ISOLATIONS

COUNTIES IN WHICH ONE OR MORE ISOLATIONS WERE MADE JUNE 29 - NOVEMBER 7, 1971

U.S. DEPARTMENT OF AGRICULTURE VETERINARY SERVICES ANIMAL AND PLANT HEALTH INSPECTION SERVICE

cases in both vaccinated and unvaccinated horses or other equidae throughout the United States. The horse is the best known sentinel animal for VEE and investigation of each suspected encephalitis case had to be concluded promptly to assure adequate lead time for control measures to be instituted. Laboratory investigations of suspected cases included diagnostic procedures for VEE, Eastern equine encephalitis (EEE), and Western equine encephalitis (WEE).

The second part of the program consisted of serological sampling of certain wild mammals, domestic dogs and domestic livestock in a well-defined belt extending from coast to coast through the vaccination zone (see map, page 7) and north of the known viral activity area in 1971. As information developed during the vector season, this belt was adjusted accordingly. For all practical purposes, equidae in the vaccination zone were of limited value as sentinel animals since over 90 percent were vaccinated.

A number of military bases with entomologists and veterinarians were located in the survey belt. They assisted in securing sera from wild mammals and dogs.

The Department of the Interior has a number of personnel in predatory pest work from Texas to California. Their assistance was very beneficial in obtaining serum samples from animals known to be capable of developing VEE antibodies, such as dogs, foxes, coyotes, opossums, raccoons, and deer.

Limited research data indicated the domestic dog might serve as a sentinel animal for the presence of VEE virus. Plans were developed to utilize dog sera collected from selected dog pounds in the survey belt. These samples were collected by Veterinary Services personnel located in the area (see map, page 8).

The third part of the program involved research and surveillance projects conducted by other agencies, including Center for Disease Control, HEW, Department of Defense, Texas A & M University, University of Wisconsin, and University of California. These projects included insect trapping and serological studies in the known infected area and outside the infested area (see maps, pages 9 and 10).

COOPERATIVE AGREEMENTS

Texas A & M University - No. 12-16-100-106 - Domestic Animal Study

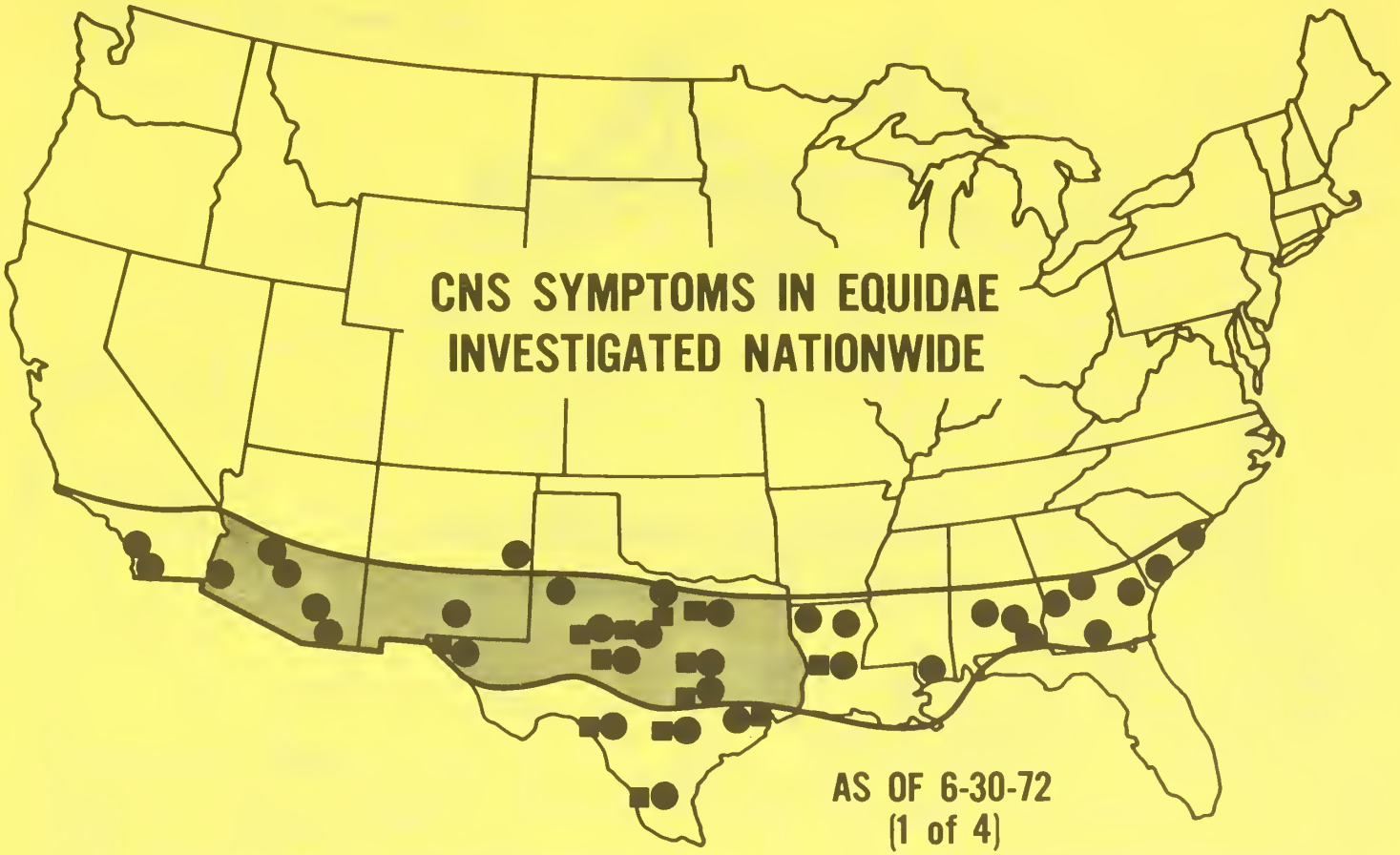
The object of this cooperative agreement was to measure the VEE antibody titers present in cattle, sheep, goats, swine and dogs in known infected areas and in areas where there are no evidence of VEE virus activity in Texas, and to relate these titers in domestic animals to persistence and movement of VEE virus in non-infected areas. Such information, as developed by this study, was intended to provide: (1) Knowledge on possible sentinel systems for the future detection of VEE; (2) field data on the VEE virus and its association with vector; (3) knowledge on the ecological habitat necessary for the maintenance of this disease and (4) a baseline of VEE antibody titers in domestic animals in an infected area.

In this study, 3,314 serum samples were collected from 1,746 cattle, 688 horses, 472 goats, 18 swine, 229 sheep, and 161 dogs. The results indicated no epidemic VEE viral activity.

Texas A & M University - No. 12-16-100-117 - Vector Survey

The object of this cooperative agreement was for the Cooperator to monitor the population size and distribution of known and potential arthropod vectors of VEE in the Texas Coastal Zone and the Rio Grande River Valley and other areas in Texas as agreed upon, and to determine the incidence of VEE within these vector populations. This surveillance procedure was intended to determine the location of the

VEE SURVEILLANCE PROGRAMS - 1972



—— Primary Surveillance Zone

Predator Control Survey

■ Dept. of Defense Bases—Including Hamsters

● Dept. of Defense Bases—No Hamsters

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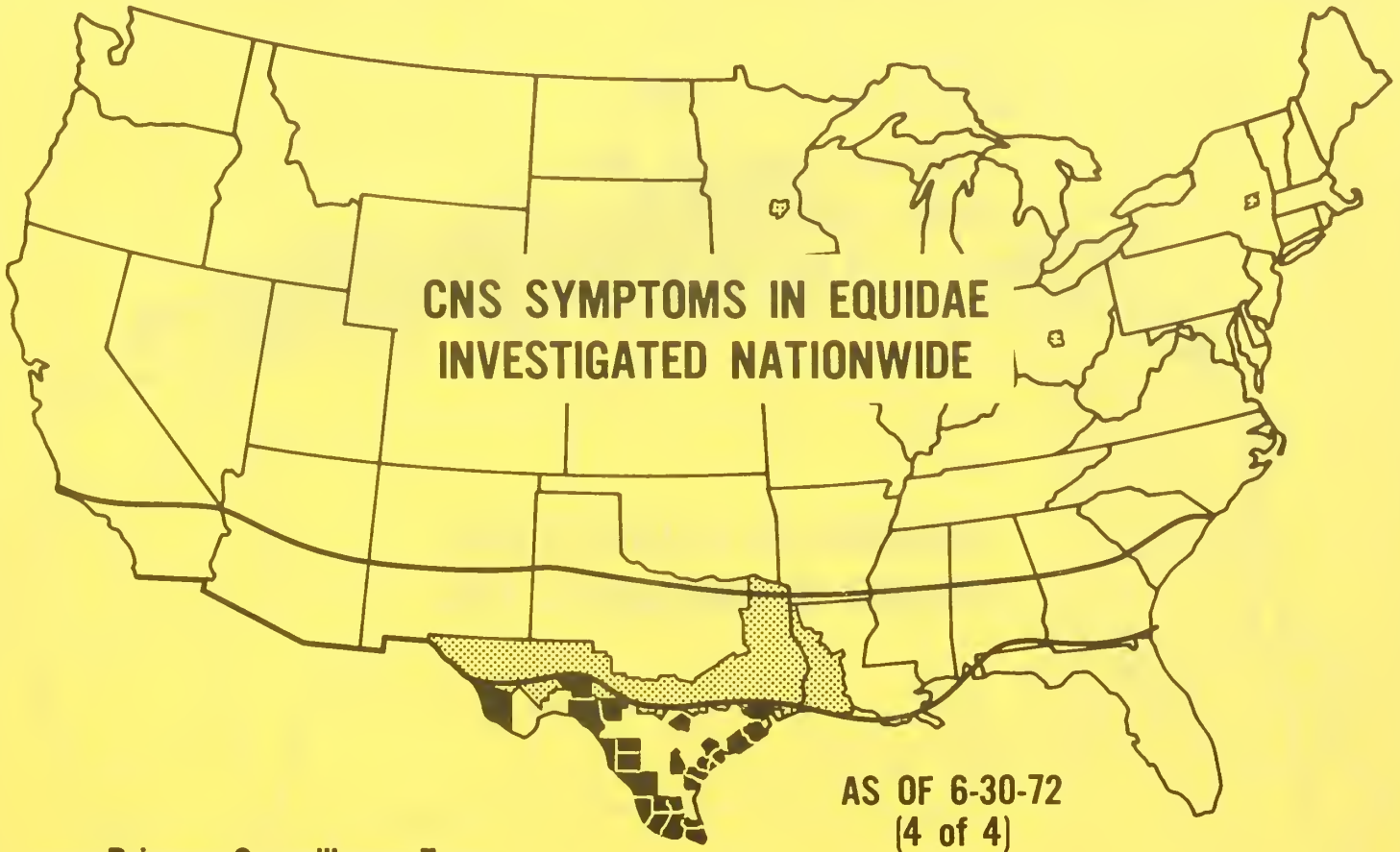
VEE SURVEILLANCE PROGRAMS - 1972



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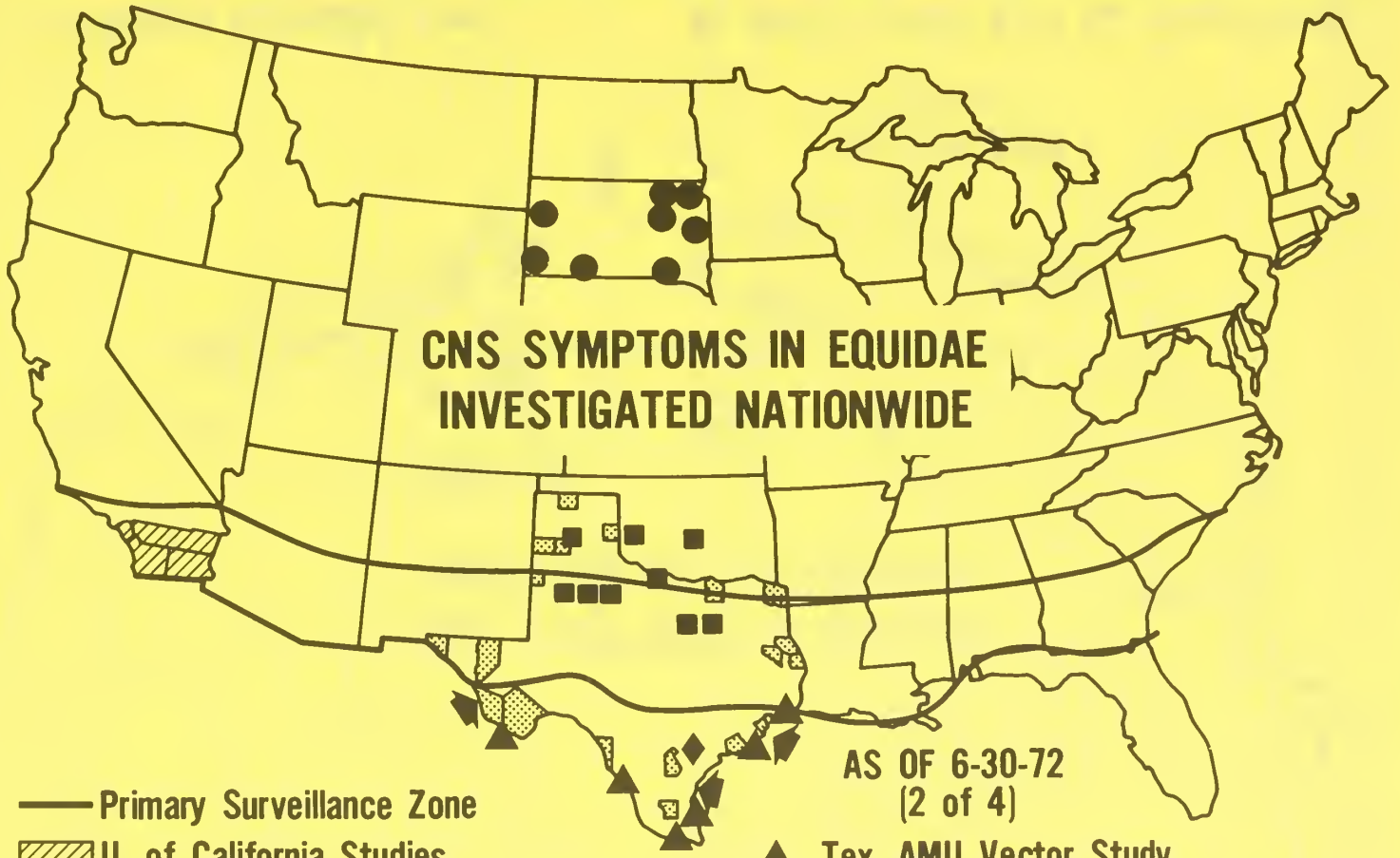
VEE SURVEILLANCE PROGRAMS - 1972



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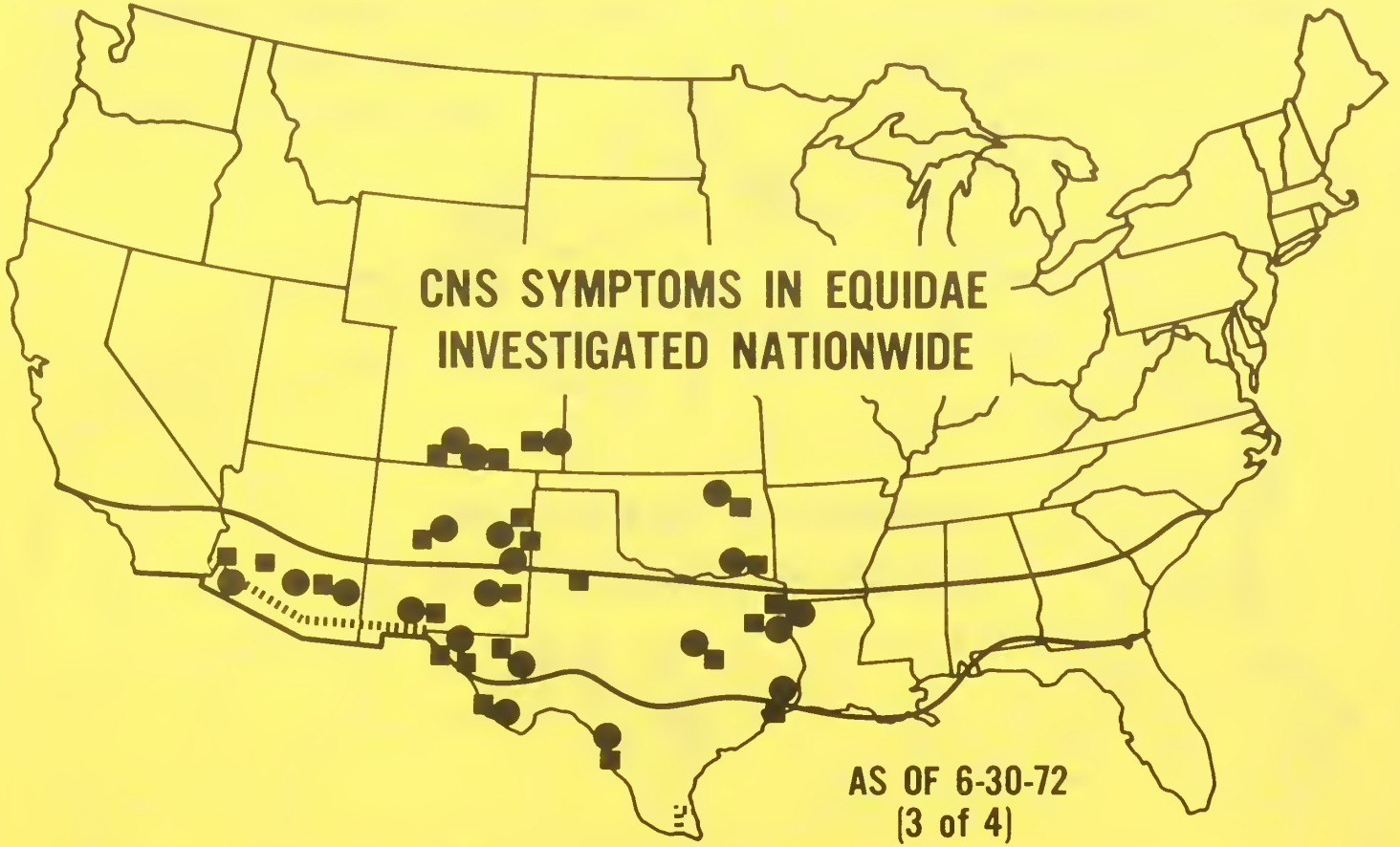
VEE SURVEILLANCE PROGRAMS - 1972



——Primary Surveillance Zone

·····CDC Atlanta–Vector Study

● CDC–Ft. Collins Burro and Vector Survey

■ USDA–ENT. Research–CDC Vector Survey

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VEE epidemic virus and provide knowledge on whether or not VEE has taken up residence in insect population. The data developed was intended to reflect the dynamics of vector populations as well as VEE virus incidence within these populations in Texas; and help to assess the present and future status of VEE in Texas.

In this study, 709,589 mosquitoes were collected, and no VEE virus was isolated.

Texas A & M University - No. 12-16-100-107 - Pregnant Mare-Foal Study

The object of this cooperative agreement was to determine whether or not any adverse effects on the mare or her foal resulted from the vaccination of pregnant mare at various stages of pregnancy with the TC-83 vaccine against VEE. Further, if there were any adverse reactions to the vaccine, to determine their frequence and significance in terms of the long-term health or performance of the mare or her foal, and to determine whether such reactions could be correlated with the stage of pregnancy when vaccinated. Such information, as developed by this study, would provide information on the relative risk of vaccinating pregnant mares. The data could then be measured against the risk of infection with the natural disease and provide knowledge of the safest time to vaccinate relative to the stage of pregnancy. Such information was essential to obtain the cooperation and confidence of horse owners and veterinarians in the use of the vaccine, vital to the national control of VEE.

This study revealed no evidence of harmful effects on the 1972 foal crop from the vaccination of pregnant mares during 1971. Because of the time of year of the epidemic and subsequent vaccination program, there were no mares tested that were less than 60 days pregnant.

University of Wisconsin - No. 12-16-100-109 - Wildlife Animal Study

The object of this Cooperative Agreement was to conduct a surveillance program in Texas, at the Welder Wildlife Foundation in San Patricio County, Tex., to determine the role of wild birds, mammals and reptiles in the epizootiology of VEE by the correlation of populations, home ranges and behavior patterns of such wildlife in San Patricio County, Tex., with the presence or lack of VEE virus antibodies in wildlife. Such information would provide: (1) Knowledge on possible sentinel systems for the future detection of VEE; (2) field data on the VEE virus and its association with wildlife, (3) additional information on possible VEE virus in wildlife; (4) a base line of VEE antibody titers in wildlife in an infected area.

In this study, 375 serum samples were collected from rodents, deer, snakes, and other mammals. There was no indication of epidemic VEE viral activity.

University of Miami - No. 12-16-100-155 - Florida Strain of VEE

The object of this Cooperative Agreement was to survey domestic animals for the presence of the Florida strain, or any other strain of VEE in Dade, Collier, and Monroe Counties of Florida, in order to provide an additional sentinel system for the possible early detection of VEE virus strains in south Florida by conducting serum antibody and virus isolation studies on samples from horses, cattle, goats, pigs, and dogs. Such survey would also aid the study of the effects and efficacy of the recent mass VEE vaccination program of south Florida.

In this study, 109 serum samples were collected from 30 dogs, 34 cats, 26 horses, 17 goats, and two pigs. The Florida strain of VEE virus was isolated from eight sentinel hamsters in the endemic area.

University of California - No. 12-16-100-108 - VEE Surveillance

The object of this cooperative agreement was to conduct a surveillance program in California in San Diego, Imperial and Riverside Counties to determine the prevalence or lack of VEE virus or antibodies in birds and mammals including bovidae, equidae, domestic canines, and domestic wild fowl. Information developed by this study would provide: (1) An additional sentinel system for the early detection of VEE if it was introduced; (2) data on VEE antibodies in domestic animals and wildlife in California; and (3) identity of arbovirus isolations obtained from insects, birds and mammals.

The sentinel equidae used in this study exhibited no clinical signs of encephalitis. No VEE virus was isolated from mosquitoes. The serology is incomplete.

South Dakota State University - No. 12-16-100-105 - VEE Surveillance

The object of this cooperative agreement was to conduct surveillance studies in animals and birds regarding the prevalence of VEE in South Dakota, which would (1) Provide an additional sentinel system for the early detection of VEE if it is introduced; (2) provide data on migratory water fowl in South Dakota; (3) provide a baseline for VEE antibodies in animals and migratory water fowl in those States where VEE is not known to exist; and (4) extend South Dakota University's current arbovirus surveillance program to include surveillance for VEE.

In this study, 537 serum samples were collected from 167 horses, 173 rodents, and 197 Canada geese. More than 200,000 mosquitoes were collected with no VEE virus isolation. Western Equine Encephalitis (WEE) virus was the principal virus isolate identified.

OTHER AGENCIES

Center for Disease Control, HEW, at Fort Collins located thirty sentinel equidae in Arizona, Colorado, Louisiana, New Mexico, Oklahoma, and Texas. A total of 177 serum samples was collected from these equidae, and all were negative for VEE virus or antibodies. Mosquitoes collected totalled 159,099. From these mosquitoes, 123 isolations were made of Western equine encephalitis virus and 25 of Turlock virus. The remainder are not Group A arboviruses. (Source: Dr. Richard O. Hayes, November 1, 1972).

California State Department of Public Health

This agency collected 172,519 mosquitoes with 47 isolates of Turlock, 64 SLE, 40 WEE, and 25 other arboviruses. (Source: 1972 Arbovirus Encephalitis Surveillance Bulletin No. 6, dated November 27, 1972).

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